

## CLAIMS

We claim:

1. For a router that uses a set of partitioning lines to partition a region of a design layout into a plurality of sub-regions, a method of pre-computing routes for nets,  
5 the method comprising:

a) for each particular set of potential sub-regions, identifying a set of routes that traverse the particular set of potential sub-regions;

b) for each particular route identified for each particular set of sub-regions,

10 determining whether the particular route is stored in a storage structure;

when the particular route is not stored in the storage structure, storing the particular route in the storage structure.

2. The method of claim 1, wherein some of the identified routes have  
15 diagonal route edges.

3. The method of claim 2, wherein a first route is identified for a first set of potential sub-region, and the first route is stored in the storage structure, the method further comprising associating the first route with the first set of potential sub-regions.

4. The method of claim 2 further comprising:

when a first route that is identified for a first set of sub-regions is already stored in the storage structure, associating the first route with the first set of potential sub-regions.

5. The method of claim 2, wherein determining whether particular routes are stored in the storage structure comprises:

using a binary tree to sort the stored routes;

traversing the binary tree to determine whether routes are stored in the storage structure.

10. For an electronic design automation ("EDA") router that routes nets within a region of an integrated-circuit layout, a method of pre-computing routes, the method comprising:

a) defining a set of partitioning lines for partitioning the region into a plurality of sub-regions;

15 b) for a first set of sub-regions,

identifying a first set of routes that connect the first set of sub-regions;

storing the first set of routes in a storage structure;

establishing a relationship between the first set of routes  
and the first set of sub-regions;

c) for a second set of sub-regions,

identifying a second set of routes that connect the second  
5 set of sub-regions;

determining whether each route in the second set is stored  
in the storage structure;

when a new route in the second set is not stored in the  
storage structure, storing the new route in the storage structure and establishing a  
relationship between the new route and the second set of sub-regions;

when an repeating route in the second set is stored in the  
storage structure, establishing a relationship between the repeating route and the second  
set of sub-regions.

7. The method of claim 6, wherein some of the identified routes have  
15 diagonal route edges.

8. The method of claim 1, wherein determining whether particular routes are  
stored in the storage structure comprises:

using a binary tree to sort the stored routes;

traversing the binary tree to determine whether routes are stored in the storage structure.

9. The method of claim 8, wherein each route is specified by a bitstring having a plurality of bits, wherein traversing the binary tree comprises traversing the tree  
5 based on the bits in the bitstrings of the routes.

10. The method of claim 9,  
wherein the binary tree includes nodes and each node includes either zero or two branches,

10 wherein each node corresponds to a particular bit in the bitstrings, wherein traversing the binary tree based on the route bitstrings comprises identifying, for a particular route bitstring, the branch to select at a particular node based on the value of the route bitstring's bit that corresponds to the particular node.

11. The method of claim 9 wherein a plurality of paths exist between the sub-regions defined by the set of partitioning lines, wherein each route's bitstring bits  
15 represent the paths used by the route.

12. The method of claim 11, wherein a plurality of the paths are diagonal paths, and wherein some of the routes traverse some of the diagonal paths.

13. The method of claim 9 wherein a plurality of inter-sub-regions exist between the sub-regions defined by the set of partitioning lines, wherein each route's bitstring bits represent the inter-sub-regions intersected by the route.

14. The method of claim 13, wherein a plurality of the inter-sub-regions are 5 diagonal inter-sub-regions, and wherein some of the routes intersect some of the diagonal inter-sub-regions.

15. The method of claim 6, wherein establishing a relationship between each particular set of sub-regions and each set of routes for the particular set of sub-regions comprises:

40 for each set of sub-regions, storing a set of references to routes,

wherein each stored reference set includes one or more references to stored routes.

16. The method of claim 6, wherein the sets of routes for some set of sub-regions includes only one route, while the sets of routes for other set of sub-regions 15 includes more than one route.